Space Weather Forecast

Issued on Tuesday, 22 March 2022 at 12:41 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight Chance of Minor Geomagnetic Storm G1 to end current UTC working week.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has risen slightly to become low over the past 24 hours, with occasional small common-class flares observed. The largest of these very minor flares appeared to emanate from a new sunspot region in the sun's southeast, a group which dominated in terms of overall size and magnetic complexity, even if not producing significant activity. The other two spots on the facing side were smaller and remained largely quiet.

No Earth-directed Coronal Mass Ejections (CMEs) were observed in the period.

Solar Wind / Geomagnetic Activity: The solar wind was at largely background levels through the period, however this unexpectedly evolved into a minor coronal hole-like regime in the final hours of the period. The source of this enhancement is not immediately clear, but it may be very belated influence from a small coronal hole feature that is now barely visible near the southwestern solar horizon.

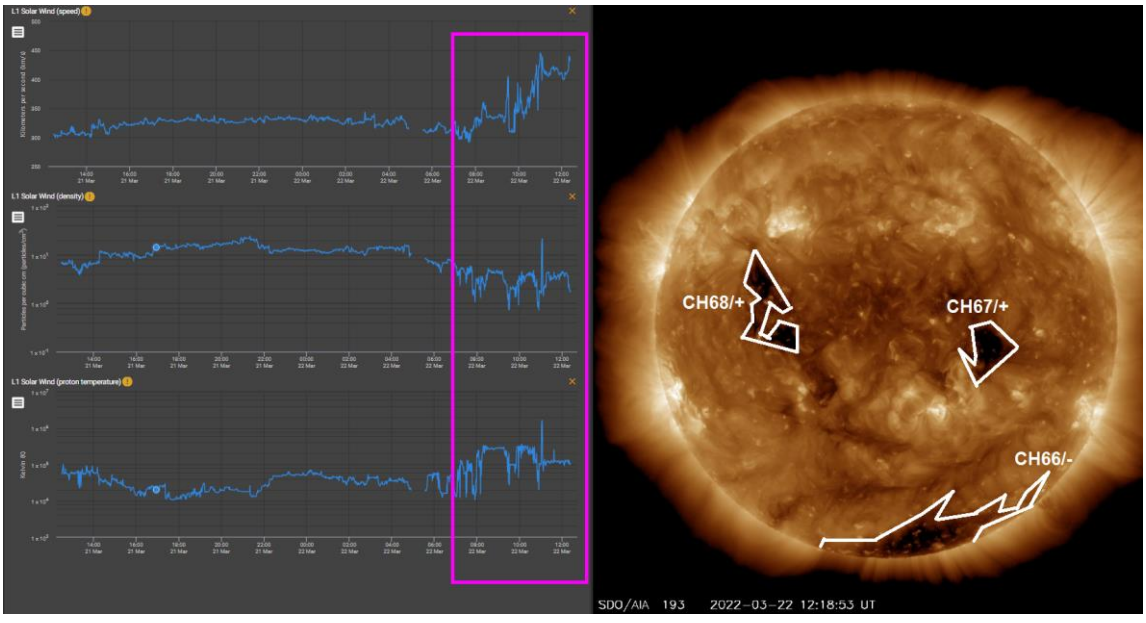

Figure 1: Solar wind speed; density and temperature over the past 24 hours, as measured by a satellite slightly upwind of Earth on the Sun-Earth line. Also shown is false-colour extreme UV imagery, with the postulated 'coronal hole' responsible for the recent fast wind (boxed magenta) perhaps 'CH66/-' in the southwest.

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The solar wind speed started the 24 hours at background levels, but underwent a sustained increase after 22/1000UTC to become slightly elevated. The number of particles in the solar wind conversely fell from slightly elevated levels to background with the onset of the fast wind, while the associated magnetic field was generally within background levels throughout.

The net result of the above solar wind measures was nevertheless quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: Solar radiation in the near-Earth environment showed the tail end of a sub-S1 level enhancement in the period, with this likely to be related to the 21 March far-sided CME event. Currently observed values are now very near typical background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to continue low, with a daily slight chance of moderate-class flares that may increase slightly with time as further sunspot regions appear to lie narrowly over the eastern solar horizon.

Solar Wind / Geomagnetic Activity: There is one possible Earth-directed CME in the forecast, potentially giving Earth a glancing blow around 24/2300UTC. There is also one non-persistent coronal hole fast wind due, most likely on Day three (Thursday 24 March). Separately, these events are not likely to be significant, however they may combine to give a peak slight chance of Minor Geomagnetic Storm G1 on Thursday 24 March, with this risk further decreasing on Friday. Activity should otherwise be mainly Quiet through midweek UTC.

Energetic Particles / Solar Radiation: Solar radiation levels should soon revert to background levels and remain so for the rest of the four-day forecast period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	10	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	5	5	5	5
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	2	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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